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THE HISTORY OF AUSTRALIAN ENTOMOLOGICAL RESEARCH.

By Anthony Musgrave.

The History of Research in Australian Entomology is so interwoven with the country's political history that a study of the science is scarcely possible without due regard being paid to those factors which have led to the foundation of our Commonwealth.

In 1841 there appeared an excellent account by Adam White, of the British Museum, on Entomological Research on Australian Insects (1), and in which he stated: "It would take up too much time to give a tithe of the names of the entomologists who have described New Holland insects, as nearly every working student of insects abroad and at home has added to the list." In a footnote he adds: "The entomologist who would attempt to do this must give a Universal Entomological Bibliography, as scarcely a Journal or volume of Transactions of any Scientific Society appears without containing fewer or more species from the great Australasian Continent and its islands."

Having spent over twenty years in the study of Australian Entomological Literature, I fully endorse all that Adam White wrote on this subject 90 years ago.

Three periods may be distinguished in our Entomological History. The first, the Fabrician Period, from 1770 to 1830, when French and British Expeditions charting our shores collected and took back to Europe the curiosities of the Antipodes; the second, the Westwoodian Period, between 1831 and 1862, when the continent was becoming gradually peopled and many specimens were sent to England by settlers; the third, the Macleayan Period, dating from 1862 to the present day. In 1862 the Entomological Society of New South Wales was founded, and henceforth students of Entomology in Australia were able to carry out much of the work which hitherto had been the prerogative of their European confreres.

The late J. J. Fletcher has given a most comprehensive account of the Macleays in his Presidential Address to the Linnean Society of New South Wales (2), in which he deals not only with that distinguished family, but with their contemporaries, so that we gain an insight into Australian Zoological Research from 1825 (the year Alexander Macleay arrived in Australia) to 1891 (the date of Sir William Macleay's death). It will be seen that the Macleays played a very active part in all three periods of our past history.

These three periods I will now consider in detail.

THE FABRICIAN PERIOD: 1770-1830.

As no insects beyond flies, and ants' (termites') nests, appear to have been mentioned by the early Dutch navigators who landed on the west coast of New Holland, Australian Entomological Research may be said to date from 29th April, 1770, when Banks and Solander, the naturalists on Captain

(1). Adam White, in George Grey, *Journals of two Expeditions of Discovery in North-west and Western Australia, during the years* 1837-38 *and* 1839, *under the Authority of Her Majesty's Government, etc.*, vol. ii., 1841. Appendix F., pp. 450-482. Notes on some Insects from King George's Sound, collected and presented to the British Museum by Captain George Grey.

(2). J. J. Fletcher, "The Society's Heritage from the Macleays." *Proc. Linn. Soc. N.S. Wales*, xlv., 4, 1920 (1921), pp. 567-635. "The Society's Heritage from the Macleays," Part ii., *ibid.*, liv., 3, 1929, pp. 184-272. (The second part issued posthumously and edited by Dr. A. B. Walkom).

James Cook's vessel, the *Endeavour*, made their first collections of insects at Botany Bay.

Here a week was spent botanizing and exploring, and probably but few insects were collected owing to the lateness of the season. No mention is made of any insects secured at Botany Bay in any of the published journals, but it was probably here that they met with the beautiful Curculionid, *Chrysolophus spectabilis* (Fabricius, 1775, *Curculio*), a species popularly known as the Botany Bay Diamond Beetle, which occurs on Acacias commonly about Sydney and Botany Bay and which was collected during the visit of the Expedition to East Australia. Another insect secured by the Expedition, and which almost certainly was taken at Botany Bay, was the female of the "Common Brown," *Heteronympha merope* (Fabricius, 1775, *Papilio*).

The next spot at which Cook and his party landed was Bustard Bay, on Wednesday, 23rd May, and here they met with the nests of the Green Tree Ants, *Oecophylla virescens* (Fabricius, 1775, *Formica*), in the branches of the Mangroves. This was the first record of this interesting ant. They also encountered caterpillars, probably those of a Limacodid moth.

At Thirsty Sound, parties landed on Tuesday and Wednesday, 29th and 30th May, and here both Banks and Sydney Parkinson (an artist) record meeting with "ants nests, made of clay as big as a bushell," on the branches of the gum trees, and Parkinson mentions the Green Tree Ant again. Banks notes, too, the presence of a small black ant which lived in the branches of a tree, *Xanthoxyloides mite*, "living in quantities in the hollow part where the pith should be." Here the butterflies also attracted the attention of Banks, one species occurring in millions. He also found "a pupa or chrysalis which shone as brightly as if it had been silvered over with the most burnished silver, which it perfectly resembled." It emerged next day, and from the brief description he gives we conclude that he had secured a specimen of *Euploea corinna* Macleay, 1826, a species stated to be among the Banksian insect types, but not described from that collection.

Palm Island and Cape Grafton were next visited, but nothing is told us of their insect fauna. Then occurred the mishap which threatened the lives of all on board the vessel. The *Endeavour* grounded on a reef, but was floated off next day, and was warped into the Endeavour River on Monday, 18th June, where she remained until 4th August.

It is more than probable that most of the insects collected by Banks and Solander were captured at the Endeavour River. This holds good, particularly for the butterflies, as Mr. T. G. Watkins has pointed out in a paper, entitled *Notes on the Butterflies of the Banks Collection* (3), that, "as there had been no previous scientific voyage to New Holland and there was no subsequent return from one prior to the publication of the Systema, in 1775, it may be assumed that all these types were obtained during the enforced sojourn at the future Cooktown in North Queensland in June to August, 1770."

Such butterflies as *Danaida affinis*, *Cupha prosope* and *Hypolimnas bolina nerina* are species commonly met with in North Queensland, and it is only reasonable to believe that these forms, later described by Fabricius, were secured at the Endeavour River.

Hawkesworth, in his account of *Captain Cook's First Voyage* (4), gives

(3). T. G. Watkins, *The Entomologist*, lvi., September, 1923, pp. 204-209.

(4). In Vol. iii., Chapter viii., Departure from New South Wales; a particular Description of the Country, its Products, and People, etc., 1773, pp. 627-630.

notes on the entomological novelties met with. Here for the first time we read of the Green Tree Ant, and an interesting account is given of the ants which frequent the natural cavities of the epiphytic plants, popularly known as "ant plants."

These parasites occur on the branches of trees, and I have seen photographs of them taken at Cooktown, so that the plant and its inhabitants almost certainly were seen at the Endeavour River by the members of Captain Cook's party.

The descriptions of the insects in Hawkesworth's account are without doubt taken from the Journal of Banks, for if a comparison be made it will be seen that they are practically identical.

Cook's first voyage, so far as Australia is concerned, terminated at Possession Island, where he took possession of the whole of the east coast of New Holland for Great Britain, calling it New South Wales.

On the return of the Expedition to England, the Journal of Sydney Parkinson, the artist on the *Endeavour*, who had died after leaving Batavia on 26th January, 1771, was edited by his brother, Stanfield Parkinson, and published in 1773. It contains the first published reference to Australian "sand-flies" (*Ceratopogon* ?), which he met with at the Endeavour River, and he has also something to say about ants.

Earlier in the same year Hawkesworth had edited and published Captain Cook's Journals, together with extracts from the Journal of Sir Joseph Banks, and in the third volume of Cook's Voyages, which treats with the exploration of the east coast of Australia, appear references to some of the insects encountered.

It was not until 1896 that the Journal of Banks was published, being edited by Sir Joseph D. Hooker. In treating with Sir Joseph Banks I should like to draw attention to Maiden's valuable work, *Sir Joseph Banks: "The Father of Australia,"* 1909, in which is given a wealth of information concerning Banks and his contemporaries.

It was not, however, until 1775 that the first scientific descriptions of the insects collected by Banks and Solander, in New South Wales, appeared from the pen of Fabricius, a pupil of the great Swedish naturalist, Linné. In his *Systema Entomologiae* he records 212 species of insects from Australia.

In his third and last voyage Cook, in the *Resolution*, put in at Adventure Bay, Tasmania, for five days from 26th to 30th January, 1777. In his Journal (5) he gives a note on the insects met with. On 14th February, 1779, Cook met his death at the hands of the natives of Hawaii.

On 20th January, 1788, the First Fleet under Governor Phillip arrived at Botany Bay. Six days later the ships of La Perouse's Expedition, *La Boussole* and *L'Espérance*, put into Botany Bay to refit after coming from Samoa. Here Father Receveur, the naturalist, who had been wounded at Tutuila, died, and was buried, a simple monument now marking his grave. After refitting, La Perouse set sail on 10th March, and all trace of him was lost to the civilized world for 38 years, until remains of the Expedition were found at Vanikoro. Expeditions sent in search of him failed to glean any knowledge of his vessels' whereabouts, but by the indefatigable efforts of the naturalists accompanying these search vessels much valuable material was collected which added materially to the knowledge of Australian Entomology.

The first of these Expeditions took place during the years 1791-1794 and was under the command of General Bruni D'Entrecasteaux, and La Billardière and Riche were the naturalists of the Expedition.

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(5). Published in *A Voyage to the Pacific Ocean*, Vol. i., 1784, p. 111.

In the *Recherche* and *Espérance* they visited Tasmania, sailing thence to the Solomon Islands and the Malay Archipelago, and then south again to South-west Australia and Southern Tasmania. Sailing north they put in at New Caledonia, where Huon Kermadec, the second in command, died, and when in the vicinity of New Britain, D'Entrecasteaux also succumbed.

The insects collected by La Billardière and Riche were described by Fabricius in his *Systema Eleutheratorum* (1801), *Systema Rhyngotorum* (1803), and *Systema Piezatorum* (1804), while Latreille (1802), re-described and figured two species of "Bull Dog" ants and other Australian species, and Lamarck (1804) described and figured two new genera and species of Australian insects.

Then in 1800-1803 came the historic Expedition of Nicholas Baudin, which has been described in all its particulars by Professor E. Scott in his *Terre Napoléon.* Baudin was in command of two vessels, the *Géographe* and the *Naturaliste,* and a small vessel, the *Casuarina,* was acquired at Port Jackson for survey work.

Péron was the naturalist and Le Sueur the artist. Maugé, another naturalist, died in Tasmania. Mr. Tom Iredale has pointed out, in an article in the *Australian Museum Magazine,* in which he deals with the French naturalists, that their names run in pairs. Thus we had La Billardière and Riche, in 1791-1794, and now we have Péron and Le Sueur.

Much valuable work in charting the coasts of Tasmania and Australia was performed and collections of insects were made at Adventure Bay, Tasmania, Sydney, King Island and Kangaroo Island.

No detailed scientific results of the entomological work carried out appeared with the narrative of the Expedition, but in Vol. ii. of the *Voyage de Découvertes,* etc., supervised by Péron, appears a description of a new species of earwig from Bruny Island, Tasmania, called *Forficula Antarctica,* and a description of the Fiddler Beetle, from near Parramatta, which he calls *Cetonia Orpheus.* In Vol. iii. of the same work appears an interesting account of the insects found on Kangaroo Island, and a comparison with those found on King Island in Bass Strait. Species collected by Baudin (?), and Péron and Le Sueur, were described by Lamarck (1804); Latreille (1809, 1811, 1818, 1824); Bonelli (1813), and Godart (1819, 1824).

Contemporaneously with Baudin's Expedition was that of Matthew Flinders, in the *Investigator,* who did detailed survey work of the Australian coast. In a footnote to his book, *A Voyage to Terra Australis,* he proposed the name "Australia" for this continent. With Flinders was Robert Brown, the botanist, who collected insects in Australia between 1801-1805, species being described by Kirby (1818), Leach (1819), Macleay (1819). Four Australian insects collected by him carry the specific name *brownii.*

In the year 1805 appeared the beautiful work, *"An Epitome of the Natural History of the Insects of New Holland,* etc.," by Edward Donovan, with 41 coloured plates and with descriptions of many new species. Many of the insects described by Fabricius were here figured for the first time. It was a notable contribution to Entomology.

During the same year John William Lewin published his *Prodromus Entomology—Natural History of Lepidopterous Insects of New South Wales,* with 18 plates, coloured by hand. Though the work was published in London, the plates were drawn and engraved in Sydney by him. He was one of the first artist-naturalists in Australia, as he arrived here in 1800. The late J. J. Fletcher (6), published a letter dated 20th February, 1805, from Alexander Macleay to Kirby, in which the former states: "I have been

(6). J. J. Fletcher, Presidential Address, *Proc. Linn. Soc. N.S. Wales,* xlv., 4, 1920 (1921), p. 572.

describing eighteen Botany Bay Lepidopterous Insects which are about to be published by Lewin, with all their changes and natural history." As some doubt has been expressed as to the truth of the contention that Alexander Macleay wrote the descriptions of the species for Lewin, this letter should silence the doubters for ever.

Fletcher gave a great amount of information about Lewin in his address, and W. W. Froggatt has published recently, in the *Australian Naturalist* for January, 1930, an account of Lewin, "The First Field Naturalist in Australia."

About this time there lived at Chelsea, in London, an artist, William Jones, who made paintings of butterflies from specimens in his own cabinets, and from those in other collections, which constitute his *Icones,* a manuscript work of six volumes, now in the Hope Department of the Oxford University Museum. Fabricius, in his work, *Entomologia Systematica,* Vol. iii., published descriptions of five new species of butterflies known to occur in Australia, and cited some of these figures with his descriptions. Donovan also referred to these *Icones.*

From 1817-1820, Louis de Freycinet, who had been a lieutenant during Baudin's Expedition, commanded an expedition, consisting of two vessels, the *Uranie* and the *Physicienne,* which visited Sydney in 1819. Quoy and Gaimard were the naturalists, and, though collections were made during the vessel's stay at Port Jackson, these were lost in a "terrible shipwreck," together with the Australian birds and Papuan butterflies. Only one Australian insect appears to have been saved from the wreck, and this species, a weevil, *Cylydrorhinus lemniscatus* (Quoy and Gaimard, 1825, *Curculio*), was taken at Shark's Bay, West Australia (6a).

In the years 1818-1822 survey work on the Tasmanian and Australian coasts was carried out by Captain Phillip Parker King (son of Philip Gidley King, former Governor of New South Wales), in the *Mermaid* and the *Bathurst.* Allan Cunningham, the botanist, was with King from the time the Expedition left Sydney on 22nd December, 1817, until its termination at the same place on 25th April, 1822, and he collected insects as well as plants.

In 1826 appeared King's *Narrative of the Survey of the Intertropical and Western Coasts of Australia,* and in Appendix B., William Sharp Macleay described the insects collected by the Expedition. Swainson in his *Zoological Illustrations* described and figured some of the species collected by Cunningham. In 1835, Boisduval in the *Magasin de Zoologie* described a new species of beetle, *Ceraegidion horrens,* from North Australia, collected by Cunningham.

In the *Narrative of the Survey,* King (7) makes an interesting record, when at Cleveland Bay, on 16th June, 1819, "Here, as well as at every other place that we had landed upon within the tropic, the air is 'crowded' with a species of butterfly, a great many of which were taken. It is doubtless the same species as that which Captain Cook remarks as so plentiful in Thirsty Sound; he says, 'We found also an incredible number of butterflies, so that for the space of three or four acres the air was so crowded with them that millions were to be seen in every direction, at the same time, that every branch and twig were covered with others that were not upon

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(6a). Described in *Voyage Autour du Monde . . . Exécuté sur . . . l'Uranie et la Physicienne, pendant les années,* 1817-20. *Publié . . .* par M. Louis de Freycinet. Zoologie, par Mm. Quoy et Gaimard, *Médecins de l'Expédition,* 1825 (on title page, 1824).

(7). Volume i., p. 195.

the wing' (8). The numbers seen by us were indeed 'incredible'; the stem of every grass- tree, *xanthorrhoea,* which plant grows abundantly upon the hills, was covered with them, and on their taking wing the air appeared, as it were, in perfect motion.

"It is a new species and is described by my friend, Mr. W. S. Macleay, in the Appendix, under the name of *Euploea hamata.*"

Accompanying the *Mermaid* and the *Bathurst* on their cruises were Frederick Bedwell and John Septimus Roe, assistant surveyors, the latter's name being associated with *Pangonia Roei* Macleay, 1826. Mr. James Hunter, surgeon, was on the *Mermaid* during her voyage from 12th June to 6th December, 1820. *Stratiomys Hunteri* Macleay, 1826, links his name with King's survey. Of the leader we have no less than six of the insects described as new by W. S. Macleay, bearing the specific name of *Kingii.* The genera are *Paecilus, Buprestis, Megamerus, Coccinella, Agrion,* and *Macroglossum.*

Among the interesting insects described in the Appendix to the *Survey* is the Spiny Leaf Insect, *Ectatosoma tiaratum* (Macleay, 1826, *Phasma*).

In 1824 the French vessel, *La Coquille,* in command of L. I. Duperrey was at Sydney from 17th January to 20th March. The naturalists to the Expedition were the surgeons R. P. Lesson and P. Garnot, and as they were here at a time of the year when insect life is abundant they amassed a very large collection. The insects were described later by Guérin-Méneville (9).

In 1824-1826 Baron de Bougainville was in command of an Expedition, consisting of the *Thétis* and *Espérance,* which was at Port Jackson from 30th June to 21st September, 1825. During his stay he erected at Botany Bay a monument to La Perouse. No collections of insects appear to have been made.

In 1826 the *Astrolabe* (formerly known as *La Coquille*) under the command of Dumont d'Urville, visited Australia, passing along the coast from King George's Sound to Port Jackson and spending some time at Western Port. New Zealand and the islands of the Western Pacific and Malaysia were visited also. In 1828 the vessel was at the Island of Vanikoro, where relics of La Perouse's ill-fated Expedition were secured.

The insects collected were described by Boisduval (10).

In the last decade of this period settlements were founded at various points along the coast and some of these, such as Melville Island (1824-1829), Western Port (1826-1828), and Raffles Bay (1827-1829) soon faded into obscurity, but others such as Moreton Bay (1825), Albany (1826), Swan River (1829) remain with us to this day. From these settlements Expeditions set out to explore the interior of the great continent.

In 1827 the Colonial Museum, afterwards called the Australian Museum, was founded. William Holmes was the first custodian under the title of Colonial Zoologist.

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(8). Hawkesworth, Vol. iii., p. 125.

(9). In Duperrey's *Voyage Autour du Monde . . . sur . . .* La Coquille, *pendant les Années,* 1822-1825. The plates, with the scientific names of the insects, appeared between 1827-1832, but the text did not appear until 1838. In 1842, Guérin-Méneville published a paper in the *Magasin de Zoologie* on the Thynnides.

(10). In Dumont d'Urville's *Voyage de Découvertes de* l'Astrolabe . . . *pendant les Années,* 1826-1829, under the title of *Faune Entomologique de l'Ocean Pacifique,* etc., the part treating with the Lepidoptera appearing in 1832 and the part containing the account of the Coleoptera and other Orders in 1835.

THE WESTWOODIAN PERIOD: 1831-1861.

This period was characterized by land exploration, and most of the insect material collected was determined by specialists in England, among whom John Obadiah Westwood stands pre-eminent.

This great entomologist was intended for the law and was admitted as a solicitor and became partner in a firm, but Entomology proved too absorbing a study, and, having private means, he was able to devote himself whole-heartedly to his favourite pursuit. To his love of Entomology he added a talent for drawing, and his *Arcana Entomologica* and *Thesaurus Entomologicus Oxoniensis* stand as monuments to his ability as an entomologist and a draughtsman. His friend and patron was the Rev. F. W. Hope, a wealthy amateur and a describer of Australian insects. In 1858, Hope "presented his collections to the University of Oxford, combined with that of Westwood himself, which he purchased, and endowed a Professorship, which Hope intended should be of Entomology, but a difficulty was thrown in the way, and a compromise was effected by instituting a Chair of Invertebrate Zoology. Westwood was the first Hope Professor" (11). His first paper was published in 1827 and his last in 1889, representing 62 years of entomological research—surely a record. Such was the man whose name I have chosen to represent this period.

Among the Expeditions which explored the hinterland of New South Wales during this era were those organised by Major (afterwards Sir) Thomas L. Mitchell, Surveyor General.

In 1831-32 he made a journey in search of the "Kindur River," exploring as far as the Karaula or Macintyre River; in 1835 he explored the course of the Darling River for 300 miles, and in 1836 led an expedition to the Darling and Murray Rivers.

Accounts of these three Expeditions were given by him in two volumes, published in 1838.

On his first Expedition he describes the effects of an attack upon him by a wasp having "passed near a tree on which their nest was suspended," and which in a footnote he describes as Genus Vespa, subgenus Abispa, species *Abispa Australiana*. This well known yellow and black "Mud dauber" wasp is now known as *Abispa ephippium* (Fabricius, 1775, *Vespa*), the subgenus having been raised to generic rank and the specific name sunk as a synonym. Smith (12) points out that the "passage in 'Mitchell's Expedition in Eastern Australia' (Vol. i., p. 104) can hardly refer to this species, as it appears to have been some gregarious wasp by which the travellers were attacked." Apart from a few species mentioned in his work, this was the only record of note.

In 1831, the corvette *La Favorite*, under the command of M. Laplace, visited Hobart during July and August, and Port Jackson in August and September. Owing no doubt to the fact that the Expedition was in Australian waters during the winter months, the number of insects recorded is small. The insects were described by Guérin-Méneville (13).

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(11). Obituary by R. McLachlan.—Professor John Obadiah Westwood, M.A., F.L.S., *Ent. Mo. Mag.* (2), iv., February, 1893, pp. 49-51.

(12). F. Smith, *Trans. Ent. Soc. Lond.* (n.s.), i., 1851, p. 181.

(13). In Laplace's *Voyage autour du Monde . . . sur la Favorite . . . pendant*, 1830-32, in Vol. v., Zoologie, pt. 2, in 1838, and the new Lepidoptera, by Baron de Feisthamel, in a Supplement to the Zoologie in 1839. The new species were also described and figured in the *Mag. de Zoologie* for 1838-1839.

In 1836, the great naturalist, Charles Darwin, on his voyage round the world, visited our shores in *H.M.S. Beagle*, under the command of Captain Fitzroy. He arrived at Sydney on 12th January, and on the 16th left for Bathurst, arriving there on the 20th and commencing his return journey on the 22nd. The *Beagle* left for Hobart on the 30th January, arriving on 5th February, and spending two days there, during which time Darwin ascended Mount Wellington. King George's Sound was reached on the 6th March, and here, eight days were spent, the *Beagle* leaving on the 14th. The dates are taken from his well known "Journal," which was first published in 1839. Conditions could not have been congenial, as Darwin's words of farewell were, "I leave your shores without sorrow or regret." During his travels in Australia and Tasmania, Darwin collected insects, and many of these are described by G. R. Waterhouse (1838-1839); Babington (1842); Saunders (1843). *Foenus Darwinii* Westwood, 1841; *Alleloplasis Darwinii* G. R. Waterhouse, 1839; *Hydroporus Darwinii* Babington, 1842; *Ideocephala Darwinii* Saunders, 1843, are Australian insects, which carry the name of our distinguished visitor.

During the years 1837-1843, *H.M.S. Beagle* explored and surveyed the coasts and rivers of Australia, Captain J. C. Wickham and later Captain J. Lort Stokes carrying on the work which had been begun by Captain P. P. King. Stokes in his work (14) furnishes an appendix to volume i., in which Adam White describes and figures the Coleoptera collected, and Edward Doubleday treats with the Lepidoptera.

From March 27 to April 5, 1839, the French corvettes, *Astrolabe* and *Zélée*, were at Raffles Bay, from whence they went to Port Essington (Victoria Town), which they left, for Aru Islands, on April 9. In December, 1839, and February, 1840, they visited Hobart, en route to and from the Antarctic.

Dumont D'Urville was in command of the Expedition, and the naturalists were Mm. Hombron (Surgeon-major of the *Astrolabe*) and Jacquinot (Captain and commandant of the *Zélée*). Le Guillou (Surgeon-major of the *Zélée*), later published descriptions of a number of Tasmanian and Australian insects in the *Magasin de Zoologie* (1841, 1842, 1844), but his name is not so well known as those of the famous pair, Hombron and Jacquinot.

The account of the Expedition, *Voyage au Pole Sud et dans l'Oceanie sur les corvettes l'Astrolabe et la Zélée; pendant les Années*, 1837-1840, was published under the direction of Jacquinot; the *Histoire du Voyage* being from the pen of Dumont D'Urville, and the *Description des Insects*, by Emile Blanchard, appearing in the Zoologie, tome. iv., 1853. Many species of insects were recorded from Raffles Bay, N. Australia, and Tasmania.

This was the last of the great French Expeditions, and, while their visits to the Pacific added but little to French colonial possessions, the value of the scientific work carried out was great, and Australian zoology has benefited considerably for their coming. Magnificent volumes of scientific results, lavishly illustrated and which have never been equalled, remind us of the part France has played in the history of our Continent.

The visit of Dumont D'Urville, in the *Astrolabe* in 1826, led to the foundation of such settlements as Western Port (1826) and Albany (1829), with a view of anticipating any attempts at colonization by France. Lord John Russell in after years related that "during my tenure of the Colonial office, a gentleman attached to the French Government called upon me. He asked how much of Australia was claimed as the Dominion of Great

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(14). *Discoveries in Australia; with an account of the Coasts and Rivers explored and surveyed during the Voyage of H.M.S. Beagle in the years* 1837-1843, etc., published in two volumes, in 1846.

Britain. I answered. 'The whole,' and with that answer he went away" (15).

During 1837-1839, Captain George Grey led two Expeditions of exploration into North-west and Western Australia, and in an appendix (cited on p. 189, footnote 1), Adam White described some species collected at King George's Sound.

In 1840-1841, Edward John Eyre carried out exploratory work in Central Australia, and, accompanied by an aboriginal, made his way overland from Adelaide to King George's Sound. On his travels he collected insects, and in an Appendix to Vol. ii. of his account of his Expeditions (16), Adam White described and figured four new species of Australian insects, and Edward Doubleday, *Description of some new Australian Lepidopterous Insects.*

During this period, Mrs. Charles Meredith, an Englishwoman, arrived in New South Wales on 27th September, 1839, and in January, 1840, settled at Homebush, near Sydney. In 1844, she published, in London, a little book entitled, *Notes and Sketches of New South Wales during a Residence in that Colony from* 1839 to 1843. In October, 1844, she and her husband went to reside in Tasmania, and here she did all that lay within her power to popularise the study of Natural History. She published several books, providing the illustrations herself, and among these may be mentioned *My Home in Tasmania during a Residence of Nine Years,* 2 vols., 1852; *Some of My Bush Friends in Tasmania,* in two series, 1869-1891, with 11 and 12 coloured plates, and *Tasmanian Friends and Foes, Feathered, Finned, and Furred,* 1881. Additional interesting information is given about her by the late J. J. Fletcher in the second part of his Address, and by Miss Margaret Swann, in the *Journal and Proceedings of the Royal Australian Historical Society,* xv., 1929, pp. 1-29.

On the 1st October, 1844, Dr. Ludwig Leichhardt left Jimbour, Darling Downs, to find a way overland to Port Essington. On his way he discovered the Dawson, Mackenzie and other rivers, and followed a stream which he called the Lynd to its junction with the Mitchell River. On 28th June, 1845, Gilbert, the naturalist, was killed by the aborigines. On the Roper River the botanical collections had to be abandoned. On 17th December, 1845, the Expedition reached Port Essington.

Amycterus Leichhardtii Macleay, 1865, from the Lynd River, N. Australia, recalls this Expedition.

In 1845, Mitchell set out from Boree, near Orange, to find a route from New South Wales to the north-west coast. After some months of travel he came to a stream running north-west and which he imagined was the head stream of the Victoria River whose mouth is on the north-west coast 1,200 miles away, and called it by this name. He then returned to Sydney. This river was found by Kennedy in 1847 to be the Barcoo or Cooper's Creek.

Among the insects collected by Mitchell on this Expedition are two Amycterid weevils, *Psalidura Mitchelli* Macleay, 1865, and *Talaurinus Mitchellii* Macleay, 1865.

The establishment of the settlements soon began to have an influence on Australian Entomology, so that in scientific journals their names as localities of insects collected commenced to appear.

References to Melville Island species are given by G. R. Gray (1834-

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(15). Russell's *Recollections and Suggestions* (1875), p. 203, *teste* E. Scott's *Terre Napoléon*, p. 277.

(16). *Journals of Expeditions of Discovery into Central Australia and overland from Adelaide to King George's Sound. In the years* 1840-1841, etc. (1845).

1837), Shuckard (1841), Bainbridge (1842), Westwood (1842), Hope (1845), and to Port Essington species by Hope (1842, 1845, 1848), Westwood (1842-1851), Saunders (1842), and Adam White (1858).

During the Westwoodian Period settlements were formed at Twofold Bay, New South Wales, in 1834, and Portland Bay, Victoria, in 1835.

In 1836, South Australia was founded, Adelaide receiving its name the following year. Among early collectors of insects in South Australia were A. H. Davis (1841), C. D. E. Fortnum (1843), G. F. Angas (1847), who wrote and illustrated a fine work, *South Australia Illustrated*, in which he gives three plates of insects and describes several as new. Dr. Behr (1847), also wrote several papers on the insect fauna of South Australia.

In 1835, John Batman and John Pascoe Fawkner settled on the River Yarra at the head of Port Phillip, and in 1837 Melbourne received its name. It was not, however, until 1851 that the Port Phillip district was constituted the colony of Victoria. Until this desirable state of affairs came about, entomologists were at a loss to know in which State Port Phillip was situated and some of their attempts to locate it, for the insects they record from this locality, are rather amusing from an Australian point of view. Westwood in his *Arcana* placed it in West Australia, and Newman in South Australia and again in New South Wales.

The first Port Phillip insects to be named appear to be those collected by Edmund Thomas Higgins, which were described by Edward Newman (1842, 1850) and Westwood (1842). Insects had been collected at Western Port during the visit of the *Astrolabe*, and, as this locality is so close to Port Phillip, therefore it should be credited with yielding the first insects of the district. In 1839, Dr. Godfrey Howitt arrived in Melbourne, and there made a large collection of insects, which were named by specialists in England; he was regarded as the foremost entomologist in Victoria for many years.

In 1840, Angus McMillan discovered Gippsland, and in the same year Count Strzelecki explored it, and while en route ascended the highest peak of the Munlong or Snowy Ranges, which he named Mount Kosciusko.

In 1842, Moreton Bay was opened to free settlers, but it was not until 1859 that Queensland was created a separate colony.

During the years 1855-1856 an Expedition, under the leadership of A. C. Gregory, landed near the mouth of the Victoria River, North Australia, and investigated the country in a west-easterly direction. A look-out was kept for traces of Dr. Leichhardt's Expedition, which had been last heard of in April, 1848. With the party as botanist was Dr. Mueller, afterwards Baron von Mueller, while Dr. J. R. Elsey acted as surgeon and naturalist. Insects collected by both naturalists were described by Adam White (16a), *Catadromus elseyi* and *Oryctes mulleranus* recalling the Expedition, an account of which was published later by the leader (16b).

In 1855, Van Diemen's Land was renamed Tasmania. During this Period several entomologists settled in Tasmania, and among them was Thomas Winter, who wrote a letter on the entomological peculiarities of Van Diemen's Land; extracts from this letter were communicated to the *Entomological Magazine*, ii., 1835, by William Swainson. Other collectors of Tasmanian insects were R. H. Lewis and T. J. Ewing.

In the years 1857-1859 the Austrian Frigate *Novara*, under the Com-

(16a). Adam White, *Proc. Zool. Soc. London*, Part xxvii., 1859, for March 8, 1859, pp. 117-123, Annulosa, pl. lviii.-lix.

(16b). A. C. Gregory, *Journal of the North Australian Exploring Expedition*, 1855-1856. In A. C. Gregory and F. T. Gregory, *Journals of Australian Exploration*, 1884, pp. 99-194.

modore B. von Wullerstorf-Urbair, voyaged round the world, and was at Sydney from 5th November to 7th December, 1858. A large number of insects was taken during the ship's stay (17).

During 1858-1868 the Swedish Frigate *Eugenie*, under the command of C. A. Virgin, was on a round the world cruise, and was at Sydney from the 22nd to 31st October, 1852, and here collections of insects were made (18).

THE MACLEAYAN PERIOD: 1862-1929.

In 1862 the Entomological Society of New South Wales was founded by Sir William Macleay, and much valuable work was published in the Transactions of the Society, in the two volumes which appeared during the years 1863 to 1873. This latter year marked the end of the Society, but its place was very competently filled by the Linnean Society of New South Wales in the following year. This Society was and still is maintained chiefly through the liberality of Sir William Macleay.

This great patron of science in New South Wales came to Australia in 1839, and after spending some years as a sheep-farmer entered politics. In 1875 he organised the *Chevert* Expedition which investigated the fauna of New Guinea and Torres Straits. His collections, together with those made by his uncle, Alexander Macleay, and his cousin, William Sharp Macleay, are housed in the Macleay Museum, at the University of Sydney, where they are in a more or less satisfactory state of preservation. Sir William Macleay also did much to further the collecting of entomological specimens by sending into the field such well known workers as the late George Masters and Mr. W. W. Froggatt. The former collector afterwards became the Curator of the Macleay Museum.

At their beautiful home, Elizabeth Bay House, on Sydney Harbour, the Macleays extended hospitality to those interested in Natural Science, and many overseas visitors have written in the most glowing terms of their visits to this sylvan retreat, now one of Sydney's most populous suburbs.

At an annual meeting of the Entomological Society of New South Wales, Sir William Macleay chose as the subject of his Presidential Address "a brief summary of the earlier history of Australian Entomology," but, as he dealt with only a few papers up to 1862, I make no apology for covering part of the same ground.

A member of the Entomological Society of New South Wales whose name will long be remembered by his work was Alexander Walter Scott, a lepidopterist, who followed in the footsteps of Lewin by investigating the life-histories of Australian Lepidoptera, which were beautifully recorded in colour by his daughters, Harriet (Mrs. Crosby W. Morgan) and Helena (Mrs. Edward Forde) (19).

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(17). *Reise der Oesterreichischen Freggate Novara un die Erde, in* 1857-1859, etc. Zoologischer Theil., 2 Bd., 4to. *Wien.*, 1864-1875.

(18). *Kongliga Svenska Fregatten* Eugenies *Resa omkring jorden,* under befal of C. A. Virgin, aren, 1851-1853. Vetenskapliga iakttagelser . . utgifna af K. Svenska Vetenskaps-Akademien. 2 Vol., illustr., 40. *Stockholm* and *Uppsala,* 1857-1910. Vol. ii., Zoologi. l.; Insecta, 1858-1868.

(19). *Australian Lepidoptera and their Transformations, drawn from the Life by Harriet and Helena Scott; with Descriptions, General and Systematic, by A. W. Scott,* M.A., *Ash Island, Hunter River, New South Wales,* Vol. i., pts. i.-iii., London, 1864. In 1890-1893, the Trustees of the Australian Museum, who had acquired the unpublished matter after the death of Scott, published in Sydney, with an amended title, Volume ii., pts. i.-iv., and which was edited and revised by Helena Forde and Arthur Sydney Olliff.

During this period the great trading firm of Caesar Godeffroy und Sohn had established at Hamburg the Godeffroy Museum, and in the scientific publication which they issued, *Journal des Museum Godeffroy,* papers were published on the Natural History of the Pacific. The collections of this Museum later were sold to other Museums. Among the collectors sent out by this Museum was Frau Amalie Dietrich, who arrived in Australia in 1863 and returned to Hamburg in 1873. Most of her time here was spent in Queensland, and she collected at Brisbane, Rockhampton, Bowen, and Port Mackay. *Nortonia Amaliae* Saussure, *Odynerus Dietrichianus* Saussure, and *Bubo Dietrichiae* Brauer, 1870, are insects which bear the name of this energetic collector.

Herr E. Dämel also collected for the Godeffroy Museum. He was in Australia during the years 1852-1860, 1866, 1871-1875, and he sent also material to Sir William Macleay. In his quest for specimens he visited Gayndah, Peak Downs, Port Curtis, Port Denison, Rockhampton, Cape York, Sydney, and West Australia. *Ialmenus Dameli* Semper, 1879, *Nyctozoilus Daemeli* Haag-Rutenberg, 1878, *Laonicus Daemeli* Haag-Rutenberg, 1878, *Mecynognathus Damelii* Macleay, 1873, are among the insects secured by him in Australia.

Among those who have left their imprint on the pages of Australian Entomology is Count Castelnau (F. L. de Laporte), a widely travelled man, who arrived in Melbourne in 1862 and died there in 1880. He is best known as a collaborator with Gory in their splendidly produced work, *Histoire Naturelle et Iconographie des Insectes Coleoptères,* published in Paris, in four volumes, in 1835-1841, and in which are described and figured a great number of our Australian Buprestidae. During his residence in Australia he published a number of papers on Coleoptera and on Fishes.

In 1891, Sir Thomas Elder organised an Expedition which "left Warrina, on the Great Northern Railway, 633 miles from Adelaide, with the intention of exploring the country to the westward, lying between the parallels of 27 deg. and 29 deg. However, the unfavourable character of the season prevented the instructions of the promoter being carried out, and the only new country passed over was on the traverse from Cavenagh Range to Victoria Spring. On reaching Annean Station, in the Murchison District, of W. Australia, in January, 1892, the party was recalled." The above information appears in a Preface to the Scientific Reports which appeared in the *Transactions of the Royal Society of South Australia,* xvi., 1892. The entomologists who contributed to these reports were Lower (1892), Blackburn (1892 & 1893), Froggatt (1893), Tepper (1893), Sloane (1893).

In 1894, William Austin Horn, member for Flinders in South Australia, fitted out an Expedition to investigate the country between Oodnadatta and Macdonnell Ranges.

A number of insects was collected on this Expedition; these are described in the first two parts of the *Report of the Work of the Horn Scientific Expedition to Central Australia.* Edited by Baldwin Spencer, 4 pts., illustr., 4to., London, Melbourne, 1896.

In 1905 a German Expedition collected a number of animals, including insects, in South-west Australia, which later were described by specialists, in the finest work on the Insect Fauna of West Australia yet produced (20).

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(20). *Die Fauna Südwest-Australiens. Ergebnisse der Hamburger südwest-australischen Forschungsreise,* 1905, herausgegeben von Prof. Dr. W. Michaelsen und Dr. R. Hartmeyer. Bds., i.-ii., 1907-1910.

Among the outstanding Australian workers of this period is Mr. A. M. Lea, Entomologist of the South Australian Museum, a most prolific writer on the Order Coleoptera, a group which comprises nearly half the known species of Australian insects, and he has described more new species than any other worker, completely eclipsing in point of numbers those described by the Rev. Thos. Blackburn.

Dr. R. J. Tillyard has produced a great number of papers on Neuropteroid insects and on fossil forms. In 1917 appeared his book, *The Biology of Dragon Flies (Odonata or Paraneuroptera)*, Cambridge, and in 1926, *The Insects of Australia and New Zealand*, Sydney, a splendidly produced work.

During 1910-1913 a party, under the leadership of Dr. E. Mjöberg, collected in Queensland and North-western Australia. A large number of insects was collected, which have been described by specialists (20a).

The first official Economic Entomologist in Australia was Mr. Charles French, senior, Government Entomologist of Victoria, according to Mr. W. W. Froggatt's Presidential Address (21); French was appointed in 1889 and retired in 1911 after twenty-two years of service. This veteran entomologist has done much to advance the science of Entomology in Australia. His work in the past was economic rather than taxonomic, and his best known publication is his *Handbook of the Destructive Insects of Victoria*, parts i.-v., illustrated in colour, by Mr. C. C. Brittlebank.

His eldest son, Mr. Charles French, junior, now fills the position of Government Entomologist.

Mr. A. Sidney Olliff was the first Government Entomologist in New South Wales. When the late Dr. E. P. Ramsay, Curator of the Australian Museum, was in London, in 1883, he selected Mr. Olliff as Entomologist of the Australian Museum, and he arrived in Sydney to take up his duties in February, 1885, and served in the capacity of Entomologist to the Museum for five years. In 1890 he resigned to take up his duties as Economic Entomologist, and he held the position until his death in December, 1895.

Mr. Walter Wilson Froggatt, who was appointed his successor in the following year, has been an energetic worker on Economic and Systematic Entomology, his output of papers being probably greater than any other Australian worker. These have appeared chiefly in the *Agricultural Gazette of New South Wales*, and the *Proceedings of the Linnean Society of New South Wales*, and *The Australian Forestry Journal*, and, as they have been illustrated for the most part by trained artists, such as Chambers, Grose, Zeck, and Miss E. King, the value of his work is enhanced accordingly. In 1907 his *Australian Insects* appeared, a work now out of print, but which was the first popular general guide to our insects. In 1923 he retired from the Agricultural Department, but served for four years in the Forestry Department, and published a number of papers in the *Australian Forestry Journal*, which later provided material for a book on forest insects.

His place in the Agricultural Department is now held by Mr. William B. Gurney.

The History of Economic Entomology in the other Australian States is given by Mr. Froggatt in his Presidential Address.

Of recent years Entomological Research has received considerable impetus, particularly in Queensland, where Sugar Experiment Stations officered

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(20a). *See* Results of Dr. Mjöberg's Swedish Scientific Expeditions to Australia, 1910-1913. *Kungl. Svenska Vetenskapakademiens Handlingar*, Bd. 52, and in *Arkiv. för Zoologi*.

(21). W. W. Froggatt, *Proc. Linn. Soc. N.S. Wales*, xxxvii., 1912, p. 19.

by their own entomologists have been established to combat pests of the sugar cane. In the Agricultural Department in Brisbane, where in the past Mr. Henry Tryon was the only entomologist, quite a large entomological staff is now employed. Though all the States cannot show the same progress as the great tropical State, still headway is being maintained. The establishment of Prickly Pear Laboratories in Queensland and near Moree, New South Wales, under the supervision of entomologists trained at a central laboratory, Sherwood, Queensland, to study the habits of those insects introduced to attack the pear have also done much to advance the Science in Australia.

So colossal are the entomological problems which face the economic entomologist in Australia that the Commonwealth Government, through the Council for Scientific and Industrial Research appointed, in 1928, Dr. R. J. Tillyard, as Chief of the Division of Entomology.

In the Second Annual Report of the Council for Scientific and Industrial Research for the year ended 30th June, 1928, p. 18, it is stated that "the lines of research that will be undertaken will be mainly those delimited by the broad term 'methods of biological control.' They may, therefore, be divided into the two following types:—

"(a) The control of insect pests by beneficial parasites or predators; and

"(b) The control of noxious weeds by their natural insect enemies.

"Among the noxious insects, he (Dr. Tillyard) suggests that attention should be given to the sheep blowfly, buffalo fly, pests of orchard and fruit crops, such as thrips, the lucerne flea and pea mite, the underground grass-grub of Tasmania, and certain insect pests of forests."

These problems, which have occupied the attention of many entomologists in the past, are of such magnitude that much time will elapse before we can expect panaceas.

In bringing my Address to a close, I may be permitted to recapitulate briefly the History of Entomological Research in Australia.

In the early Fabrician Period, collectors like Banks and Solander submitted their gatherings to entomologists such as Fabricius, who named all their insects. Then followed the great French Expeditions whose naturalists made large collections which were taken to France and the results published in magnificent volumes. These gave way to the land explorer and the settler, who sent the insects they had secured overseas to workers such as Adam White and Westwood, who issued the descriptions of them in British and Continental scientific periodicals. At a more recent period Australian workers are describing new forms in scientific journals, published locally.

The all-round entomologist now seems to have disappeared almost entirely, having given way to the specialist, and so we find institutions such as the Division of Entomology at Canberra, with large staffs concentrating on single entomological problems.

What does the future hold in store? Taxonomy is an ever-present problem, as the numbers of species of insects are so great and steadily increasing that to identify them or to find names for them is now no easy task, and involves increasing researches into literature and careful analysis of species and redescription of old types. The literature, too, has increased to such an extent since the days of Fabricius that the Australian worker without access to large libraries is at a complete loss. The problem of storing, cataloguing and indexing literature is an acute one, and scientific works are, as a rule, expensive.

I do not claim to have given you a tithe of the names of the entomolo-

gists who have described our insects; at best I have given you an outline of the History of Australian Entomological Research, but I hope that at some future date I may be able to place before you a Bibliography of Australian Entomological Literature so that you may gain some idea of the extent of the entomological work produced during the past 155 years.

THE CICADA BIRD.

(*Edoliisoma tenuinostre.*)

By Norman Chaffer.

Plate xvii.

For quite a considerable period during my early bird observing trips I was puzzled and intrigued by a strange bird call. It was unlike the notes of any birds of my acquaintance and bore a considerable resemblance to the drumming of a Cicada. Starting moderately loud, the frequently repeated notes would gradually swell in volume and then suddenly cease. The performance would be repeated several minutes later. The singer, too, was rather difficult to locate as the call had quite a ventriloquial quality. One could not be sure that the bird was close at hand or some distance away. The call, too, carried well, and could quite easily be heard a quarter of a mile from the singer. I later found that the author of the call was the Jardines Caterpillar eater or Cicada bird, and that the loud repeated notes were those of the male.

A considerable difference in coloration exists between the two sexes. The male is of a general slate grey colour. The side of the face is black and the wing quills black, edged with grey. The outer tail feathers are black, tipped with grey, and the inner feathers slate grey, with a black spot near the end and a grey tip. The approximate length of the bird is 9½ inches. The female is brownish grey above, with the wing feathers edged lighter. The face is blackish; the tail dark brownish grey edged whitish. The under surface is light greyish brown, indistinctly barred with blackish.

The Cicada bird occurs along the northern and eastern portions of Australia, showing a preference to thickly timbered hillsides, near the sea. It keeps to the topmost branches of the trees, where it secures the insects, which constitute its food. But for the loud note it would often be passed by unnoticed. About Sydney it is migratory in habit, arriving here in October. Cicadas form one of its favourite foods, and at times it appears to subsist almost entirely on these insects.